

## REPORT SUMMARY

West Onslow Beach and New River Inlet (Topsail Beach), North Carolina  
March 10, 2008

### STUDY INFORMATION

**Study Authority.** Section 101 of the Water Resources Development Act (WRDA) of 1992 authorized the construction or implementation of the West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project at Topsail Beach, Pender County, North Carolina, which reads as follows,

*Except as provided in this section, the following projects for water resources development and conservation and other purposes are authorized to be carried out by the Secretary substantially in accordance with the plans, and subject to the conditions, recommended in the respective reports designated in this section:*

*(15) WEST ONSLOW AND NEW RIVER INLET, NORTH CAROLINA. – The project for flood control, West Onslow and New River Inlet, North Carolina: Report of the Chief of Engineers, dated November 19, 1991, at a total cost of \$14,100,000, with an estimated Federal cost of \$7,600,000 and an estimated non-Federal cost of \$6,500,000.*

The Energy and Water Development Appropriations Act for Fiscal Year 2001, Public Law 106-377, included funds for the Government to initiate a General Reevaluation Report (GRR) of the currently authorized West Onslow Beach and New River Inlet (Topsail Beach) Shore Protection Project, and the remaining shoreline at Topsail Beach.

**Study Sponsor.** The Non-federal sponsor is the Town of Topsail Beach, North Carolina.

**Study Purpose and Scope.** The purpose of the study is to review the proposed storm damage reduction project as authorized for Topsail Beach and to determine changes, if any, to be recommended for the authorized project. An array of alternatives is evaluated for feasibility over a 50-year period of analysis. The scope of the study includes the borrow areas and the authorized project limits and extends to the town's entire ocean shoreline.

**Project Location / Congressional District.** Topsail Beach is located at the southern end of Topsail Island adjacent to New Topsail Inlet in Pender County on the central North Carolina coast. See Figure 1. The study area lies entirely within North Carolina's Congressional District 7.

**Prior Reports and Existing Water Projects.** There were several reports on navigation and shore protection in the Topsail Beach vicinity. The two most recent and relevant reports are listed in the next two paragraphs.

**a. Reports**

1.) "Detailed Project Report on Improvement of Navigation, New Topsail Inlet and Connecting Channels." This July 1965 report, approved by the Chief of Engineers April 7, 1966, authorized construction of a channel 8 feet deep by 150 feet wide through New Topsail Inlet. A connecting channel through Banks Channel to the Atlantic Intracoastal Waterway was also authorized under Continuing Authorities Program, Section 107 of the River and Harbor Act of July 14, 1960.

2.) "West Onslow Beach and New River Inlet, North Carolina," House Document No. 393, 102nd Congress, 2nd Session. This Final Feasibility Report and EIS (Report of the Chief of Engineers, November 19, 1991) was conducted pursuant to four congressional resolutions adopted between 1970 and 1979 regarding beaches, channels and inlets in the greater vicinity of Topsail Island. Studies for navigation purpose were conducted separately. The report recommendation was a dune and berm system at Topsail Beach 19,200 feet long including transition sections.

**b. There are two nearby navigation projects.**

1.) Atlantic Intracoastal Waterway (AIWW). The 308-mile-long North Carolina portion includes a navigation channel with a depth of 12 feet and widths varying from 90 feet in land cuts to 300 feet in open waters; side channels and basins at a number of locations; and five highway bridges. The main channel of the AIWW in North Carolina was completed in 1940. Some of the dredged material removed during maintenance activities is beach quality sand, which is placed directly on nearby ocean beaches, when practicable; otherwise, it is stockpiled in confined disposal areas. The AIWW parallels Topsail Beach about 2 miles landward.

2.) New Topsail Inlet and Connecting Channels. An 8'x150' channel New Topsail Inlet, with 7'x80' connecting channels to the AIWW. The connecting channels are through Old Topsail Creek (1.42 miles) and Banks Channel (6.27 miles), both between the AIWW and New Topsail Inlet.

**Federal Interest.** The recommended plan provides an opportunity to achieve coastal storm damage reduction through construction of a dune and berm project, a traditional Army Corps of Engineers mission. At October 2007 cost levels and an FY2008 interest rate of 4 7/8% the plan has average annual costs of \$4,119,000 which are exceeded by average annual benefits of \$13,590,000. The resulting benefit to cost ratio is 3.3 to 1. The recommended plan of improvement is consistent with Army policy, environmentally acceptable, economically feasible, and technically sound. When evaluated at 7% interest rate the benefit to cost ratio is 3.0 to 1.

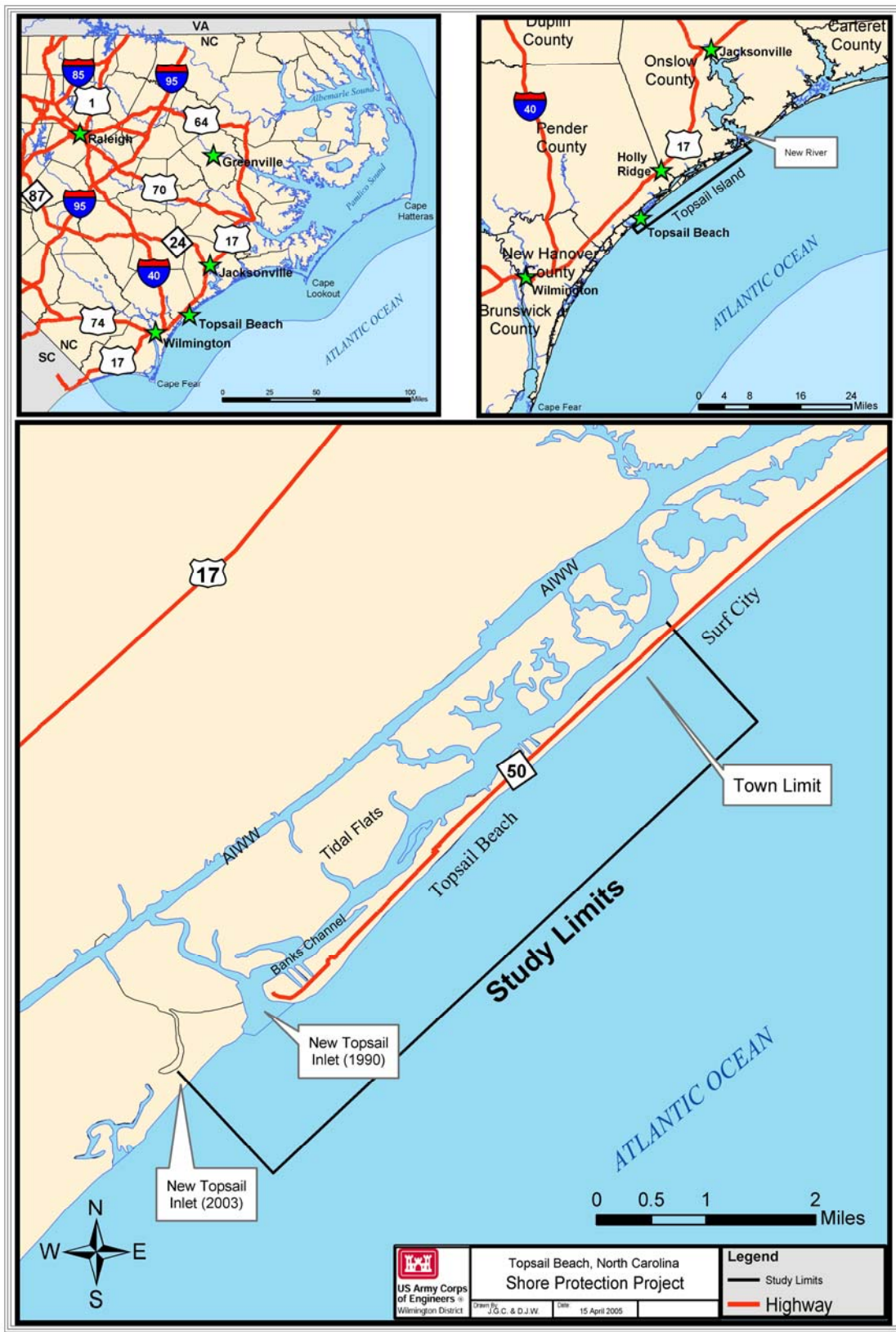


Figure 1.

## STUDY OBJECTIVES

**Problems and Opportunities.** Topsail Beach is subject to hurricanes and other tropical storms, and northeasters. The long term erosion and short term erosion from various storms erode the beach and undermine homes and other structures along the shoreline. A lesser amount of damage occurs from flooding and wave action. The average annual structural damage is estimated at \$9,238,000 when evaluated at October 2006 levels and a 4 7/8% interest rate. The loss of the beach between the shoreline and the existing structures reduces the area available for recreation and for natural habitat, such as sea turtle nesting.

**Planning Objectives.** The purpose of the study is to reduce the adverse economic and environmental effects of hurricanes and other storms at Topsail Beach by finding solutions that are protective of the environment through avoidance or minimization of impacts to natural resources.

**Planning Constraints.** Planning constraints are the geographic limit of the authority, applicable Federal and state laws, and limits of knowledge and predictive ability.

## ALTERNATIVES

**Plan Formulation Rationale.** In this GRR the planning process was not limited to re-evaluating the authorized plan; instead the process includes evaluation of an array of alternatives. There were two changes in the without project condition leading to this decision. One is that New Topsail Inlet, at the southern end of the study area has continued to migrate southwestward and away from the study area, as shown in Figure 2. The second is that both the total square footage of structures and the replacement value per square foot of the structures has increased the potential benefits of extending the project area to the town limit. Because the project authority is specifically storm damage reduction, no separable recreation or environmental restoration measures were included.

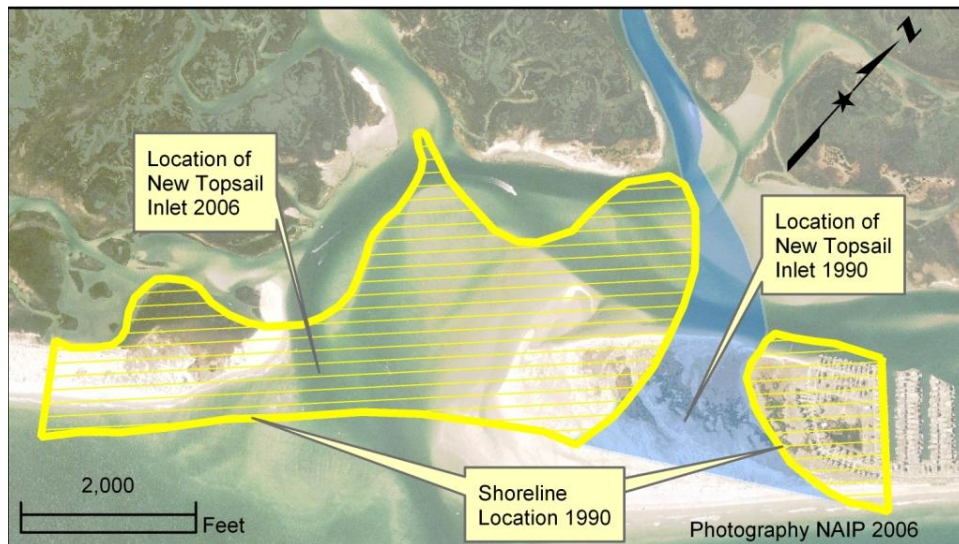


Figure 2

**Management Measures and Alternative Plans.** Both nonstructural and structural measures were considered.

Nonstructural measures considered are changes in regulations and physical modifications to reduce damages. Nonstructural regulatory measures are coastal building codes, building construction setbacks, and floodplain regulations. Most regulatory measures are no longer considered for potential in the alternative plans because these measures have already been implemented, they do not affect older structures, and there are few remaining vacant lots, suitable for development, which would benefit. These measures are considered as part of the existing and without-project conditions. Another category of nonstructural measures is removal of beachfront structures from the threat. The three removal measures are 1) retreat landward within the same property parcel, 2) relocation a longer distance to a vacant property, and 3) demolition. Acquisition of the vacated property is included in both the relocation and demolition measures. All of these removal measures were retained for consideration in the nonstructural alternative.

Structural measures considered were beachfills and hard structures such as breakwaters, seawalls, revetments, bulkheads, groin fields and a terminal groin. Beachfill measures consist of berms, dunes, and terminal sections. The beachfill measures are considered some of the most appropriate, since they mimic the natural environment and can be shaped to maximize net storm damage reduction benefits. A terminal groin at New Topsail Inlet was included in the NED plan in the 1991 Chief of Engineers report, although it was not part of the authorized plan. This terminal groin was also retained for consideration in the GRR. The other types of hard structure measures were dropped from further consideration because, although they may reduce structural damages, each would have different potential adverse impacts to the beach.

**Final Array of Alternatives.** Plans that qualified for the final array of alternatives are the nonstructural plan and variations of beachfill plans. The beachfill plans include various widths of berms combined with various dune elevations. The beachfill plans also include termination alternatives such as a transition section at each end and a terminal groin for south end. The Wilmington District economic damage simulation model, GRANDUC, was used to predict present value damages for the without project condition, the nonstructural plan, and the various beachfill plans. By comparing the without project damages to residual with project damages, project benefits could be estimated for each plan. The GRANDUC model also predicts present value costs based on estimated volume of beachfill for initial construction and later renourishment events. For New Topsail Inlet's present location, the terminal groin alternative did not result in lower renourishment volumes or costs than the transition section. Due to higher initial cost without a reduction in renourishment costs, the terminal groin was eliminated as a measure.

Nonstructural Alternatives. Costs for moving structures are very specific and vary greatly depending on site conditions, travel route, and on structure size and construction. To simplify the evaluation, structures were categorized as one of three types, and only one third of the existing vacant lots were assumed available for relocation. Costs for each

type of structure were estimated for each of the three measures – retreat, relocation, and demolition.

The GRANDUC model was also used to evaluate benefits of the nonstructural plan. The structure database was modified to delete all structures planned for relocation or for demolition and to increase shoreline distance for structures planned for retreat. The damages were recomputed based on this revised database to estimate residual damages for the nonstructural plan, and so to estimate benefits. Because the nonstructural plan does not prevent beach erosion, no recreation benefits were assigned.

The evaluation of this plan was conducted at October 2004 levels and 5.375% interest rate. The estimated present value figures are \$108 million in benefits and \$117 million in costs. The overall net benefits are negative \$9 million with a benefit to cost ratio of 0.9, and is not economically feasible.

Beachfill Alternatives. Beachfill plan borrow site investigations were started early in the study. The Chief's Report referenced in the authorizing legislation described the borrow site as being in New Topsail Inlet and in Banks Channel. Since then New Topsail Inlet has migrated to the southwest and now lies within the Lea Island Coastal Barriers Resources Act (CBRA) Unit. During the GRR offshore borrow sites were investigated and found suitable for beachfill materials and preferred to the prior sites. One borrow source suitable for pipeline cutterhead dredging will be used for initial construction and several other sites suitable for hopper dredging will be used for future renourishment.

The entire length of the Topsail Beach shoreline was divided into 1,000 foot long reaches for evaluation of feasibility. The beachfill alternatives naming convention is the first 2 digits are the dune elevation and the second two digits are the berm width. The 1350 plan was used to test reaches for feasibility and all reaches were found to be economically feasible. Next the net benefits of variety of dune and berm plans were evaluated. Initially there was wider array of berm widths and berm-only plans. The 50 foot berm width plans had the highest net benefits, and the formulation was repeated with a 50-foot berm with and a range of dune elevations at 1 foot intervals. At the request of the sponsor, a set of plans were developed with an extension of the dune 400 feet to the south and a 400 foot reduction in the southern transition section length. These plans are identified with letter X suffix, such as Plan 1250X.

Table 1 presents the economic comparisons of the plans as described above. All values are shown as average annual equivalent value discounted at the FY2005 federal water resources interest rate of 5 3/8 % over a 50-year project life. Recreation benefits were not included in the formulation of the project with respect to size and scope.

Table 1 Economic Comparisons, Average Annual Values in Thousands.  
October 2004 levels. 5.375% interest rate.

Plan	Berm Width (feet)	Dune Elevation (ft, NGVD)	Dune length (feet)	Benefits	Costs	Net Benefits
1150	50	11	22,800	\$6,383	\$2,927	\$3,456
1150X	50	11	23,200	\$6,387	\$2,943	\$3,444
1250	50	12	22,800	\$6,584	\$3,013	\$3,571
1250X *	50	12	23,200	\$6,588	\$3,027	\$3,561
1350	50	13	22,800	\$6,775	\$3,185	\$3,590
1350X	50	13	23,200	\$6,783	\$3,204	\$3,579
1450	50	14	22,800	\$7,002	\$3,321	\$3,681
1450X	50	14	23,200	\$7,012	\$3,337	\$3,675
1550 **	50	15	22,800	\$7,168	\$3,440	\$3,728
1550X	50	15	23,200	\$7,179	\$3,463	\$3,716
1650	50	16	22,800	\$7,301	\$3,574	\$3,727
1650X	50	16	23,200	\$7,312	\$3,596	\$3,716
1750	50	17	22,800	\$7,385	\$3,705	\$3,680

\* Locally Preferred Plan

\*\* National Economic Development Plan

**Comparison of Alternatives.** The NED and Locally Preferred Plans are described below.

Plan 1550, having the greatest net economic benefits, is the National Economic Development (NED) Plan. Plan 1550 consists of a 26,200-foot long dune and berm system to be constructed to an elevation of 15 feet NGVD fronted by a 7-foot NGVD (50-foot wide) beach berm with a main fill length of 22,800 feet, from Godwin Avenue to the Topsail Beach town limit, and having 2,000-foot transition on the north end and a 1,400-foot transition on the south end.

The Town of Topsail Beach has selected Plan 1250X as the Locally Preferred Plan (LPP). Plan 1250X consists of a 26,200-foot long dune and berm system to be constructed to an elevation of 12 feet NGVD fronted by a 7-foot NGVD (50-foot wide) beach berm with a main fill length of 23,200 feet, from a point 400 feet southwest of Godwin Avenue to the Topsail Beach town limit, and having 2,000-foot transition length on the north end and a 1,000-foot transition on the south end.

**Key Assumptions.** The key assumptions made for this study are that the present physical and social trends will continue into the 50-year project life. We assume that damaging storms will continue to occur with comparable strength and frequency as have occurred in the past. The demand for vacation and permanent homes at the beach will result in new structures being built on any suitable remaining property and existing structures rebuilt after being destroyed by storms. The replacement structures will have to conform with property line and ocean front setback restrictions, with minimum Federal Flood Insurance elevations, and with new and stronger building codes, which will result in more damage-resistant structures.

Key assumptions regarding beach modifications are that, other than reshaping of the dune and beach after storms, no other major beach nourishment project in the study area will be constructed by any non-Federal government due to the limited resources of the community. Some minor beach renourishment may be accomplished with local funding or after declared disasters when FEMA funding is available. These minor projects will not significantly alter the feasibility of a major Federal shore protection project.

**Recommended Plan.** The selected plan for recommendation is the LPP, Plan 1250X. The NED Plan having the highest net benefits as indicated in Table 1 is Plan 1550. Both plans meet the project objectives and constraints. Table 2 provides pertinent physical data on the Authorized Plan, the GRR LPP, and the GRR NED Plan.

Table 2          Topsail Beach, NC          Plan Dimensions

Dimensions	Plan		
	Authorized HD 393/102/2	<b>GRR, LPP, Plan 1250X</b>	GRR, NED, Plan 1550
Dune, topwidth	25 feet	25 feet	25 feet
Dune, elevation, NGVD	13.6 feet	12 feet	15 feet
Dune, landward slope	5H:1V	5H:1V	5H:1V
Dune, seaward slope	5H:1V	10H:1V	10H:1V
Dune and storm berm, width	35 feet	None	None
Dune and storm berm, elevation, NGVD	9.6 feet	None	None
Dune and storm berm, seaward slope	5H:1V	None	None
Beach berm, width	40 feet	50 feet	50 feet
Beach berm, elevation, NGVD	7.6 feet	7 feet	7 feet
Beach berm, seaward slope	12H:1V	15H:1V	15H:1V
Dune and berm fill, length	10,250 feet	23,200 feet	22,800 feet
North transition section, length	7,150 feet	2,000 feet	2,000 feet
South transition section, length	1,800 feet	1,000 feet	1,400 feet
Total Length	19,200 feet	26,200 feet	26,200 feet
Volume, initial, in-place	*4,566,000 CY	2,387,000 CY	3,420,000 CY
Volume, renourishment, in place	644,000 CY	690,000 CY	690,000 CY
Renourishment interval	2 years	4 years	4 years
Borrow source	Banks Channel	Off shore	Off shore

\*including 644,000 CY advance nourishment

The project sponsor supports for Plan 1250X as the Locally Preferred Plan. During completion of the Draft GRR, the sponsor indicated that some of the reasons for preferring Plan 1250X over NED Plan 1550 are;

- a. Both plans move the shoreline significantly seaward,
- b. Plan 1250X costs 24.1% less, but reduces net benefits 2.3%,
- c. Plan 1250X has the greatest HSDR benefit to cost ratio, and the second highest total benefit to cost ratio,
- d. Plan 1250X has a lower cost to the Town,
- e. Plan 1250X will have lower Congressional appropriation requirements, and
- f. Plan 1250X provides better protection to the Godwin Avenue area.

Other common features of both plans are dune vegetation and construction of dune 23 walkover structures. The real estate to be acquired for the project will be a Perpetual Beach Storm Damage Reduction Easement for approximately 397 parcels. Based on project maps and ground examination, no structures appear to be impacted. There is no separable recreation feature, however incidental recreation benefits will be gained from the wider beach.

**Systems / Watershed Context.** The recommended project is located on the Atlantic Ocean shoreline of a barrier island. There is no upland or watershed involvement. The offshore borrow areas are beyond the depth of closure and therefore no negative effect on the shoreline will occur due to removal of sand for the project. Sand initially placed on the beachfill will redistribute offshore to approximately the 23 foot depth contour. No nearshore hardbottom exists at Topsail Beach that may be covered by the redistributed beachfill. A comprehensive beach and inlet monitoring program is planned to assess and ensure project functionality throughout the project lifetime.

**Environmental Operating Principles.** The GRR was conducted in accordance with the Environmental Operating Principles. The proposed project to reduce damage to beach structures also protects the beach, enhances recreational use, and improves the beach environment. Effective collaboration and coordination with Federal, state, and local resource agencies throughout the planning process was instrumental in formulating an environmentally sustainable project that minimizes impacts while still meeting the project goals. Comments received during public review were intently considered and incorporated into the selected plan where appropriate. Construction activities on the beach and at the borrow sites are limited both in location and in seasons to avoid impacts to significant resources and protected species, specifically hard bottom communities, sea turtles, and piping plovers. Borrow materials were sampled to insure compliance with North Carolina's sediment compatibility standards for beach placement of sediment. Additional sampling will be conducted prior to initial construction and each nourishment event to further refine the confidence of sediment compatibility in order to minimize impacts of beach construction activities. During construction environmental inspections will be made of the dredging and beachfill placement to assure quality control of environmental standards. A borrow area contingency plan will be developed and coordinated with the resource agencies in order to identify reasonable alternatives as well as define potential mitigation actions in the event unexpected material is encountered.

Post construction monitoring will be conducted to determine if adjustments to the periodic nourishment cycles are needed.

**Peer Review.** The Alternative Formulation Briefing (AFB) was held in July 2004. The Draft GRR was prepared with recommendations from the AFB Project Guidance Memorandum (PGM). The Draft GRR Independent Technical Review (ITR) was led by the Philadelphia District. The Draft GRR ITR resulted in 185 comments, all of which have been resolved and closed as of March 2006. The ITR comments were related to adding documentation and clarification and to removing inconsistencies throughout the document however none resulted in any changes to without project assumptions or to the plans developed. After revisions from an April 2006 In-Progress Review, the Draft GRR and EIS was released simultaneously for Public Review and Policy Review in June 2006. A Cost Review was coordinated by Walla Walla District during revisions resulting from Public and Policy Review of Draft GRR. A legal review was conducted and the report has been certified as legally sufficient. The GRANDUC shore projection economics model was reviewed by HQ and SAD during the Dare County shore protection study. After recommended revisions GRANDUC was judged to provide reasonable and consistent comparisons of the damages to be expected in the area and the damage reduction potential associated with various plan alternatives. An ITR of the GRANDUC model coordinated through the PCX-CSDR for application to the Topsail Beach GRR concluded that GRANDUC results in reasonable estimates of project benefits and costs.

## EXPECTED PROJECT PERFORMANCE

**Project Costs.** Project costs are reported at October 2006 price levels and the FY2007 interest rate of 4.875%. See Table 3. Updated to October 2007 the Total Project Costs are \$32,131,000 for Initial Construction and \$9,202,000 for Renourishment.

Table 3        Topsail Beach, NC, Project Costs

Construction Item	Initial	Renourishment
Lands & Damages	\$1,585,000	0
Beach Replenishment	\$27,900,000	\$8,065,000
Engineering & Design	\$1,116,000	\$598,000
Construction Management	\$450,000	\$230,000
Total Project Construction Costs	\$31,051,000	\$8,893,000

**Equivalent Annual Costs and Benefits.** Annual costs and benefits are reported at October 2006 price levels and the FY2007 interest rate of 4.875%. Tables 4 and 5 contain information as of October 2006 on Total First Cost, Total Investment Cost, and Annual Costs. See Tables 4, 5, and 6. As of October 2007 the Interest During Construction is estimated at \$275,000 for the Selected Plan resulting in Total Investment Costs of \$32,406,000. The Total Annual Cost updated to October 2007 levels is \$4,119,000.

Table 4 Topsail Beach, NC, Investment Costs, October 2006 levels

Item	Amount
Total First Cost	\$31,051,000
Interest During Construction	\$266,000
Total Investment Cost	\$31,317,000

Table 5 Topsail Beach, NC, Annual Costs, October 2006 levels. Present value is discounted to FY2011.

Item	Year	Amount	Present Value
Total Investment Cost	2011	\$31,317,000	\$31,317,000
Renourishment	2015	\$8,893,000	\$7,351,000
Renourishment	2019	\$8,893,000	\$6,077,000
Renourishment	2023	\$8,893,000	\$5,023,000
Renourishment	2027	\$8,893,000	\$4,152,000
Renourishment	2031	\$8,893,000	\$3,432,000
Renourishment	2035	\$8,893,000	\$2,837,000
Renourishment	2039	\$8,893,000	\$2,345,000
Renourishment	2043	\$8,893,000	\$1,939,000
Renourishment	2047	\$8,893,000	\$1,603,000
Renourishment	2051	\$8,893,000	\$1,325,000
Renourishment	2055	\$8,893,000	\$1,095,000
Renourishment	2059	\$8,893,000	\$905,000
Total Investment Cost, Present Value			<b>\$69,401,000</b>
Annual Costs			
Interest & Amortization, 50 years at 4 7/8 %			\$3,728,000
Monitoring			\$240,000
OMRR&R			<u>\$21,000</u>
Total Annual Cost			<b>\$3,989,000</b>

Average Annual Benefits are shown in Table 6. Updated to October 2007, The Selected Plan's Total Annual Benefits are estimated at \$13,590,000. The Selected Plan, 1250X will reduce average annual storm damages by 84%. Some residual damages will still occur, estimated to average \$1,521,000 (Oct. 2006 level) per year over the 50-year period of analysis. The Selected Plan has a benefit to cost ratio of 3.3 to 1 and has annual net benefits of \$9,471,000. Table 7 (Oct. 2006 level) presents all applicable economic results for both plans and at the FY2008 interest rate and the OMB test interest rate of 7%. Escalated to Oct. 2007 levels the Selected Plan's benefit to cost ratio at 7% is 3.0 to 1.

Table 6, Expected Annual Benefits, October 2006 levels, 4.875% interest rate.

Benefit Category	Expected Annual Benefit
	Selected Plan, LPP
Hurricane and Storm Damage Reduction	
Storm Erosion	\$6,130,400
Flood*	\$(64,400)
Wave	\$71,300
Land and Long Term Erosion	<u>\$1,580,000</u>
Subtotal, rounded	\$7,717,000
Emergency Costs and Other Damage Reduction	\$ 87,000
Recreation	\$ 5,500,000
Sub Total Annualized Benefits	\$13,304,000
Benefits During Construction, negligible	<u>\$ 0</u>
<b>TOTAL EXPECTED ANNUAL BENEFITS, SELECTED PLAN OF IMPROVEMENT</b>	<b>\$13,304,000</b>

\*Benefits are recategorized to Flood as damages from other causes are reduced.

Table 7 Interest Rate Sensitivity Analysis - Compare Plans 1550 (NED Plan) and 1250X (Locally Preferred Plan) October 2006 levels at 7.0 percent interest

1550 Plan (NED Plan)	4.875%	7.000%	% change
HSDR Benefits	\$ 8,367,000	\$ 8,604,000	2.8%
Average Annual Costs	\$ 4,560,000	\$ 5,297,000	13.9%
Net Benefits	\$ 3,807,000	\$ 3,307,000	-15.1%
BCR (HSDR benefits only)	1.8	1.6	
Recreation Benefits	\$ 5,500,000	\$ 5,500,000	0.0%
Reduced Emergency Costs	\$ 87,000	\$ 87,000	0.0%
Total All Benefits	\$ 13,954,000	\$ 14,191,000	1.7%
Net Benefits	\$ 9,394,000	\$ 8,894,000	-5.6%
BCR (All benefits)	3.1	2.7	
1250X (Locally Preferred Plan)	4.875%	7.000%	% change
HSDR Benefits	\$ 7,717,000	\$ 7,940,000	2.8%
Average Annual Costs	\$ 3,989,000	\$ 4,527,000	11.9%
Net Benefits	\$ 3,728,000	\$ 3,413,000	-9.2%
BCR (HSDR benefits only)	1.9	1.8	
Recreation Benefits	\$ 5,500,000	\$ 5,500,000	0.0%
Reduced Emergency Costs	\$ 87,000	\$ 87,000	0.0%
Total All Benefits	\$ 13,304,000	\$ 13,527,000	1.6%
Net Benefits	\$ 9,315,000	\$ 9,000,000	-4%
BCR (All benefits)	3.3	3.0	

**Cost Sharing.** The selected plan, Plan 1250X, includes a 400-foot extension of the berm and dune to the south. A similar plan without the dune extension is Plan 1250. When Plan 1250X is compared to Plan 1250, the incremental benefits do not exceed the incremental costs. This incremental first cost for the additional 35,000 CY of beachfill and 1 acre of dune vegetation is estimated to be \$273,000 at October 2007 cost levels. Defining the \$273,000 incremental cost as a 100% non-Federal cost and applying the 35% non-Federal cost share to the remaining project first costs results in an overall 35.6% non-Federal cost share and a 64.4% Federal cost share, as shown in Table 8. This change does not increase renourishment volume, renourishment cost, or renourishment cost sharing. The selected plan cost is lower than the NED plan cost (Plan 1550) and therefore the Federal share will not exceed 65% of the NED plan cost. Cost sharing for renourishment will be 50% Federal and 50% non-Federal. OMRR&R costs are 100% non-Federal. The sponsor intends to provide public access and parking as needed in the northern part of town before the PCA is signed. The PCA will include cost sharing percentages applicable to the shoreline uses and public access at the time of execution. Cost sharing for all project phase are shown in Table 8.

**Table 8 Initial Project Construction Cost Allocation and Apportionment, Oct. 2007 levels**

INITIAL PROJECT CONSTRUCTION COSTS					
Project Purpose	Project First Cost	Apportionment %		Apportionment \$	
		Non-Federal	Federal	Non-Federal	Federal
Hurricane & Storm Damage Reduction	\$32,131,000	-	-	-	-
Locally Preferred Plan, Incremental Cost	\$273,000	100%	0%	\$273,000	\$0
Locally Preferred Plan, Shared Costs	\$31,858,000	35%	65%	\$11,150,300	\$20,707,700
LERRD Credit				\$1,403,000	\$0
Cash Portion, Shared Costs				\$9,747,300	\$20,707,700
Hurricane & Storm Damage Reduction	\$32,131,000	-	-	-	-
Locally Preferred Plan, Resulting Costs					
Cash Portion, Shared Costs				\$9,747,300	\$20,707,700
Cash Portion, Incremental Costs				\$273,000	\$0
Cash Portion, Resulting				\$10,020,300	\$20,707,700
LERRD Credit				\$1,403,000	\$0
Total	\$32,131,000	35.6%	64.4%	\$11,423,300	\$20,707,700
PERIODIC RENOURISHMENT COSTS					
Project Purpose	Cost per Operation	Apportionment %		Apportionment \$	
		Non-Federal	Federal	Non-Federal	Federal
Hurricane & Storm Damage Reduction	\$9,202,000	50%	50%	\$4,601,000	\$4,601,000
MONITORING COSTS					
Project Purpose	Cost per Year	Apportionment %		Apportionment \$	
		Non-Federal	Federal	Non-Federal	Federal
Monitoring	\$240,000	50%	50%	\$120,000	\$120,000
ANNUAL OMRR&R COSTS					
Project Purpose	Cost per Year	Apportionment %		Apportionment \$	
		Non-Federal	Federal	Non-Federal	Federal
General Repair, Maintenance, Inspection	\$21,000	100%	0%	\$21,000	\$0

**Project Implementation.** The non-federal sponsor for project implementation is the Town of Topsail Beach, North Carolina. The non-federal sponsor's responsibilities will be defined in a PCA. Topsail Beach will acquire some tracts for construction of the transition section in the adjacent Town of Surf City, which supports the project. The State of North Carolina often provides a large fraction of the non-federal funds to project sponsors.

**Operation, Maintenance, Repair, Rehabilitation, and Replacement (OMRR&R).** Periodic renourishment is classified as continuing construction, not as OMRR&R. OMRR&R requirements will consist of project inspections and dune vegetation maintenance. Dune vegetation maintenance includes watering, fertilizing, and replacing dune plantings as needed. Other maintenance is reshaping of any minor dune damage, repairs to walkover structures and vehicle accesses, and grading of any large escarpments. Estimated OMRR&R annual costs are \$21,000.

**Key Social and Environmental Factors.** Key factors socially are recreational use of the beach by residents and visitors. Increased recreational value is a significant incidental benefit, but was not a factor in formulation of the plan. Plans that would hinder the recreational value of the beach were rejected. For example, seawalls would reduce the usefulness of the beach at high tide and hinder the use of the beach as a natural habitat.

There is no mitigation action required for this project. Efforts made to minimize impacts are avoidance of the offshore hardbottom areas and scheduling construction in cold weather seasons. Section 7.03.6 of the Final GRR & EIS contains a list of 24 specific items of monitoring and commitments.

**Stakeholder Perspectives and Differences.** The Topsail Beach General Reevaluation was closely coordinated with the project sponsor, the Town of Topsail Beach. A representative of the town's shoreline protection committee attended almost all PDT meetings, and other members of the town administration attended most PDT meetings. The town administration participated in the Value Engineering study process and in the AFB. The town also reviewed the AFB Pre-Conference materials and the Draft GRR. The significant difference was that the town had an interest in seeking borrow material from Banks Channel and New Topsail Inlet which was the borrow site described in the previous Chief's Report for the Authorized Project. The Final GRR recommends offshore borrow sites because the most of the Inlet borrow site now lies with a CBRA unit and the remaining Bank Channel volume is a small amount that requires mobilization of an additional dredge.

The Draft GRR and EIS was circulated for review by state and Federal agencies and environmental groups in June 2006. Substantive comments concerned borrow material compatibility, potential existence of nearshore hardbottom areas, and avoiding impacts to sea turtles and piping plover. The comments resulted in some changes writing of the Final GRR and EIS, but did not change the design of the recommended plan.